Food plants for *Phyllium bioculatum* Gray in Sri Lanka.

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Key words
Phasmida, *Phyllium bioculatum*, Foodplants, Sri Lanka.

A search through such literature as we have been able to lay our hands on says precious little about the food plants of leaf insects other than that they can be reared on Guava (*Psidium guajava* - Myrtaceae). Alain Deschandol (1990) gave an account of food plants for *Phyllium* spp. gleaned from the literature and Pat Matyot (1990) gave his views on food plants of *Phyllium bioculatum* in the Seychelles.

The genus *Psidium* belongs to tropical America and the W.Indies, while the leaf insects are from the Australasian region. It stands to reason that guava as such cannot be the "original" food plant, despite the fact that the guava leaf is so perfectly mimicked by leaf insects. The family Myrtaceae itself, however, is more widely distributed in the tropics and there are genera within it which are native to Sri Lanka e.g. *Eugenia* and *Syzigium*.

Despite the fact that guava is introduced, there is more than a superficial association between the two. For instance, in Sri Lanka the vernacular name for a leaf insect is "pera kolaya" (guava leaf) and *P. bioculatum* certainly occurs on guava here. Our guess is that *P. bioculatum* has certain tall forest trees (perhaps in the Myrtaceae) as the natural food plant here in Sri Lanka, and that, when the guava was introduced, the species spread on to the newcomer. People would rarely "bump into" a leaf insect (and to see them you have to practically bump into them) on a tall tree. One would be more likely to find them on the (rather small) guava tree however, especially when picking fruit.

In support of this hypothesis we would offer two rather anecdotal stories. Firstly, Green (1909) stated that leaf insects could be found in the Kandy district. He said that the locals would locate them by waiting under trees they were known to live in and watching for falling pieces of green leaves dropped by the feeding insects. The implication from this is that at that time they were associated with forest trees rather than the guava.

The second such story concerns a conversation with Nimal, our contact in Ekneligoda village where we are making a long-term study. It seems that leaf insects are rarely found on guava in the village and we chanced to ask what the local name was. Did they still call them "guava leaves"? In reply we were told that it depended what they were feeding on. They were "dehi kolaya" (lime leaves) when they were found on dehi, "etamba kolaya" (Ceylon mango leaves) on etamba, "kottamba kolaya" (Indian almond leaves) on kottamba and so forth. It seemed that leaf insects were associated with leaves of a whole range of fruit bearing plants. Maybe they are polyphagous and it is human behaviour (i.e. whether we get up amongst the leaves and branches to pluck fruit) that determines where we find them. Never the less, this may not be the whole story. In captivity they seem to accept some food plants much more readily than others.

As we are finding leaf insects in Ekneligoda, you would think that the food plant would be obvious by now. Unfortunately this is not the case. The specimens we have found have mostly been newly hatched nymphs. Given that they may not feed for the first day or two, one has to assume that they are "in transit". The trees overhanging the place where they are found are perhaps more likely to be the true food plants.

In the end we have four lines of evidence on trying to pin down food plants:
1) The plants on which we find them;
2) The trees associated with sites where they are found;
3) Plants on which the villagers say they have found them;
4) Plants that they have been raised on in captivity.

It should be made clear at the outset that none of these lines of "evidence" is anything more than tenuous. Only when we find second instar and above specimens feeding on native trees are we sure of our facts. Bearing this in mind, so far we have indications that they may feed on twelve plant species from seven different families. To this tally, further species and families may be added from other authors as follows:

Myrtaceae
We have found adult females on *Psidium guajava*, guava. We also have trustworthy reports of leaf insects on *P. cattleyanum*, strawberry guava. There is also "jambu" (rose apple, *Eugenia jambos* [= *Syzigium jambos*]); Mr Wijayasiri, a local insect breeder, says that they can be raised on this although they do not take to it readily. Pat Matyot collected a nymph from it (Matyot, 1990).

One villager recently claimed to have found leaf insects on "Dun" (*Eugenia corymbosa*). Pat Matyot also describes females picked up underneath trees of *Eugenia malaccensis* [=*Syzigium samarangense*]. This mode of discovery tallies exactly with our experience in relation to mango (see below).

Anacardiaceae
If pressed as to main food plant for leaf insects, "etamba" (*Mangifera zelanica*) is the one that Nimal chooses. In addition, he has more than once found mature (senescent?) adults that have fallen out of a particular etamba tree. He recently provided us with two well grown specimens from this tree. Pat Matyot states that some collectors in the Seychelles reported finding leaf insects on mango. I have raised leaf insects on Indian mango (*Mangifera indica*) at home, and Nimal has found a mature female under a *M. indica* tree. *Mangifera* is a genus which is native to the area. It is likely to be one of the true "original" food plants. "Kadju" (Cashew, *Anacardium occidentale*) is also said to be a food plant.

The Anacardiaceae contains 55 genera, and 500 species (6 genera and 18 species in Sri Lanka). It includes some widely distributed forest trees and would be a good family to investigate for potential food plants.

Rutaceae
After the "etamba", the "dehi" (lime, *Citrus aurantifolia*) is considered the next most common food plant in the village (though not any other citrus species). It is native to the area and a likely food plant, though we have yet to confirm it. Alain Deschandol (1990) quotes three references to *Citrus* species, as food plants for leaf insects.

Leguminoseae
Nearly all the nymphs that we have collected from Ekneligoda have been found on "karanda" (*Pongamia glabra*). Virtually all of them have been the bright scarlet colour of a freshly hatched nymph (the exception was of a colour that suggested an age about three days from hatching, still very young). Despite the caveat about young nymphs not giving much indication of food plants, there is such a consistent association that one does begin to wonder! Two further caveats should

be added, however. One is that the karanda form a large proportion of the undergrowth in this particular location. Another is that once you have success in one spot you cannot help but be drawn back to it. Both these factors may create a bias in the data. Where the kavanda grows there is also a large tree called naimbul (*Harpulia imbricata*, a member of the Sapindaceae) which Nimal has successfully used as a foodplant for caged leaf insects.

Elaeocarpaceae

The Ceylon olive or Veralu, *Elaeocarpus serratus* has been mentioned as a probable foodplant by several people. Most recently a villager whose statements can be taken as reliable affirmed that he had found leaf insects on this plant.

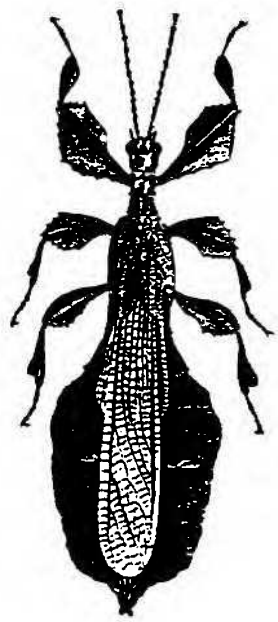

Figure 1. The original illustration of Gray's male *Phyllium bioculatum*.

Combretacae

The villagers say that Indian almond (*Terminalia catappa*) is a food plant. Interestingly, Pat Matyot (1988) quotes Guerard as giving Indian almond as a food plant for leaf insects.

In June 1995 we visited the Botanic Gardens in Kandy and talked to the gardeners; there was one in particular who was very informative. He said that the time to look for them is just before the rains when *Terminalia belerica* loses its leaves and "all the leaflets fall to the ground, then you often find leaf insects under the trees". I have often wondered about Green's (1906) description as it would imply too high a population density of leaf insects, it would attract predators. Could it be that there was a little bit of mis-communication and that really they were finding insects under trees that had shed their leaves?

After talking to the gardener we went on into the park. We soon came to a nice big tree labelled *Terminalia belerica*. Its branches and leaves were high up and inaccessible so we searched the ground. Within the first couple of minutes we found a leaf insect egg! This confirmed the gardener's statements in relation to *T. belerica* and makes us inclined to believe that his statement about another foodplant is reliable.

Bignoniaceae

The same gardener said that they had found a leaf insect just a few days earlier on bulu (*Tabebuia serratifolia*). *Tabebuia* is an introduced genus so it is not a native foodplant.

Other families

Alain Deschandol (1990) adds two tropical plants not mentioned above, *Theobroma kakao* (Cocoa, Sterculaceae) and *Thea sinensis* (Tea, Theaceae) both records are attributed to Linnaeus (although Deschandol does not state which species of *Phyllium* was involved, it is unlikely to have been *P. bioculatum* because this species was not known to Linnaeus). The latter plant was also mentioned in the village as one on which nymphs may sometimes be found. As the village is a part of a tea plantation, however, I did not give much credence to the suggestion - just about everything must end up on tea at some time in Ekneligoda!

Pat Matyot (1990) also states that specimens were found either under or on *Anona reticulata* (Bullock's heart, Anonaceae), *Artocarpus heterophyllus* (Jack fruit, Moraceae) and on *Sandoricum* spp. (Meliaceae).

What conclusions can we draw from the above? The finding of adult females where they have

fallen from a tree provides fairly good evidence that the plant families Anacardiaceae and Myrtaceae provide "natural" food plants for *P. bioculatum*. Beyond that there is very weak support for as many as ten other families (taking our findings along with those of Alain Deschandol and Pat Matyot). Even if only a few of these are eventually substantiated it would imply that *P. bioculatum* is polyphagous.

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